RADIOCARBON DATES FOR MAIORO, N51/5, SOUTH AUCKLAND, 1965-66

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Abstract. The 1965-66 excavations at the South Auckland site of Maioro were described and interpreted by Aileen Fox and R.C. Green in the previous volume. Their report indicated that six radiocarbon samples had been submitted for age determination, and would be reported when available. The results are now to hand and provide a 13th century A.D. estimation as the age for the initial open settlement occupation of the site, and a 15th century date as the time for its major use as a stockaded *pa*.

When the results of the 1965-66 excavations at the South Auckland site of Maioro (N51/5) were reported, it was indicated that six samples had been submitted for radiocarbon analysis, but at the time of going to press no results had been received from the D.S.I.R. Radiocarbon Laboratory at the Institute of Nuclear Sciences. Thus it was possible to make only a general assessment of the site's chronology (Fox & Green 1982:77). A four phase sequence was postulated. The first was use of the site as an undefended or open settlement, with storage pits, *rua* and terraces. In the second phase the summit portion became a palisaded enclosure with the natural slopes around the knoll being steepened by scarping. Inside the enclosure there were several domestic structures, fireplaces and *hangi*, a new set of roofed storage pits, and new underground *rua*. The third phase was like the second but involved reconditioning and strengthening of the defences, and the building of a new pair of roofed storage pits. In the last phase the defences were abandoned, and a shallow burial was made in the summit area, while on the sides various underground *rua* and storage pits were constructed. A large 6 m square pit on the ridge to the south was also assigned to this phase (Fox & Green 1982:76-77).

Phases 2 and 3 were interpreted as suggesting a relatively short occupation of four or five generations or about 100 years beginning in the sixteenth century A.D. and continuing thereafter (Fox & Green 1982:78). The results of the six radiocarbon determinations when corrected for secular variation so as to provide calendrical ages, indicate that the initial occupation may have been some centuries earlier than expected, and that the main occupation during phases 2 and 3 more likely began in the fifteenth century A.D., and ended in the sixteenth century. They also suggest that the big pit on the ridge belongs to the first rather than the last phase of the occupational sequence.

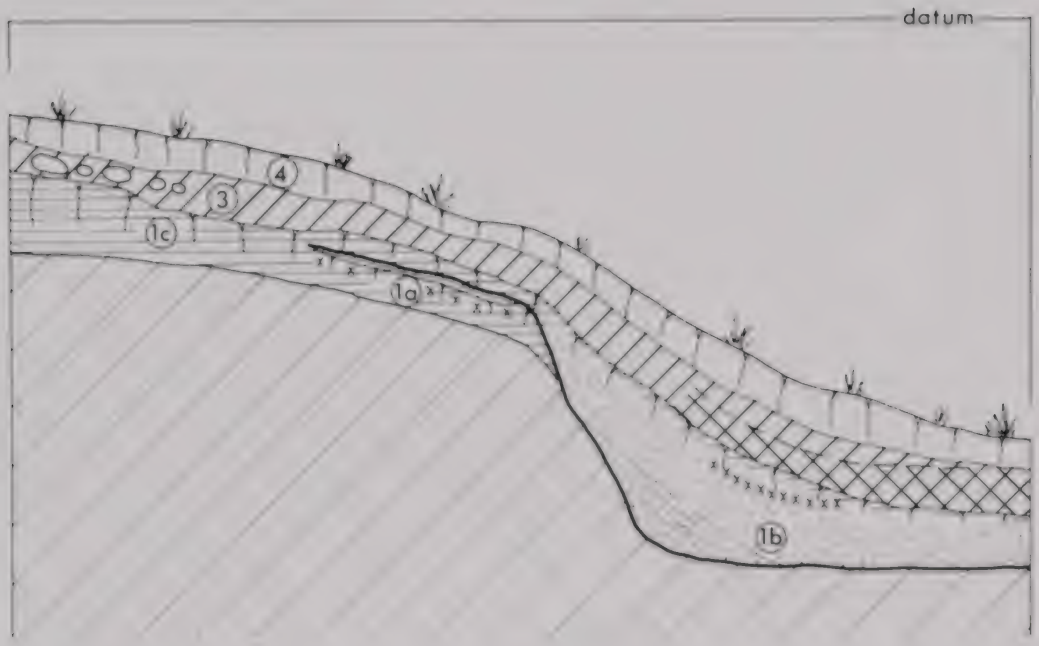
Context of dates

One sample of wood and charcoal, AU 2056, was taken from the south side of Square E6. It was found in fill at the foot of phase 1 terrace scarp, at the base of the second layer in that square. The second layer in this part of the square derives from a compact white sandstone and yellow loam layer above the terrace scarp which has slipped, washed

or been thrown down over a dirty light brown sandy loam that had initially accumulated on this side of the knoll, especially along the steep scarp of the phase 1 terrace. The situation is illustrated in Fig. 1. Above the terrace scarp the surface of the phase 3 second layer is firmly associated with the later alignment of palisade postholes on this side (Fox & Green 1982:62). The earlier line of palisade postholes derived from the phase 2 surface of the soil horizon immediately under it. Indications of a still earlier occupation surface, associated with phase 1 and the terrace, were also noted on this side in this section only.

On the downhill side of this square charcoal lenses and patches frequently occurred either near the surface of the phase 1 fill (as in the illustrated section) or at the base of the overlying second layer. Presumably they derive either from charcoal associated with the phase 1 activities, which had been eroded from higher up and deposited here, *or* they derive from occupation debris that accumulated beyond the earlier phase 2 palisading, which at that time occupied this surface along this side of the knoll. For this reason, the derivation of this sample is ambiguous with the basal second layer context, suggesting it is slightly more likely that it derives from phase 2 than from phase 1. However, the radiocarbon age of the sample (NZ 6278) of 873 ± 55 years B.P. clearly implies that phase 1 is a more reasonable interpretation when compared with the remaining radiocarbon results (see below). Therefore an alternative is to consider that while its position derives from phase 2 activity, the result has an inbuilt age, a situation commonly encountered in New Zealand (McFadgen 1982:384). Thus the result may well represent a use of old wood and charcoal of phase 1 during the phase 2 occupation on the knoll, or it may also represent use of contemporary wood and charcoal deposited there during phase 1 in a context undisturbed by phase 2 activities. The sample was, in either case, scooped up with the second layer fill during the refurbishing of the inner knoll surface when the palisade of phase 3 was constructed and the earthen material from the interior distributed to the perimeter of the palisaded enclosure and down the side of the knoll. The conclusion I reach, is that the result is a useful estimate for the age of the phase 1 occupation, however one interprets it.

A sample (AU 2003) catalogued as "posthole material (not a charcoal sample) from the Square F7 part of *baulk F-G7*" was collected on 1 January 1966. The collection date was when the pit and deep posthole of the baulk feature, interpreted as a rack or *whata* support (Fox & Green 1982:68), were both excavated and drawn up. This was after the features and sections of Square F7 itself, and especially of long pit 8, had been completed on 30 December 1965. Thus this sample does not come from long pit 8 of Square F7 as originally believed by Fox & Green (1982:65). The fill of the squarish post pit above the deep posthole of the *whata* feature is not indicated on the published section drawing (Fox & Green 1982: Fig. 8 Y^2-Y^1) but on the original section drawing notes it is stated to be "a very fine light brown sandy fill with some lumps of sandstone (packing around the post?) which was probably cut and filled in the earlier period . . .". The notion that Green had then that the posthole was later, on analogy with nearby Rua 6, is inappropriate and of course stratigraphically impossible. Rather both the squarish post pit with deep posthole and the adjacent slanting post pit in G7 (Fox & Green 1982: Fig.8), with the same fill, are clearly recorded on the original sections and plans as early features. Therefore the *whata* post on stratigraphic evidence should not be assigned to the phase 2 reconstruction of the palisaded enclosure on the summit (Fox & Green 1982: Fig.11), but interpreted as a feature of the open settlement of phase 1. Incidentally the slanted post adjacent to and contemporary with it, now makes sense as probably being for the notched log ladder used



Phase 4 - upper modern soil horizon on loose brown sandy loam (10YR 4/6)

Phase 3b - later period palisade posts cut from surface of layer 2b

Phase 3a - white sandstone blocks and yellow loam (10YR 5/6) grading into yellow loam in central part of section and then into a compact medium brown to grey to black stained zone (5Y 2/1)

Phase 2 - early period palisade posts cut from surface of lower soil horizon layer

Phase 1c - lower buried soil horizon developed on loose light brown sandy loam (10YR 3/4)

Charcoal bits or lens

Phase 1b - colluvial and windblown dirty light brown sandy loam

Phase 1a - local lens of sandstone and sandy loam with charcoal at base dividing a lower soil horizon from one above and indicating level of first phase occupation associated with terrace below

Sandy to clay loam natural (10YR 6/8)

Fig. 1. Detailed cross-section for north-eastern wall of Square E6, Site N51/5, Maioro (see Fox & Green 1982: Fig.6 for location of section).

to gain access to the small structure or rack built at the top of the post support. They are associated with a fine polished argillite adze (Fox & Green 1982:68, 72 & Fig. 17).

The radiocarbon age of the sample (NZ 6275) of 821±47 B.P. fully supports the phase 1 interpretation for its context. The deep posthole was some 180 mm (7.2 inches) in diameter so it is doubtful that the post it contained had more than 20 to 40 rings or that they came from a tree more than 60-80 years old. For this reason the sample is regarded as giving, when taken towards the younger end of its age range, a reasonably good indication of time for the phase 1 occupation.

Sample AU 2082 was of small *pipi (Paphies australe)* shell recovered from a ¼ inch sieve in the southeast quadrant of the Square F10-11, excavated to define the very large Pit 10 located on the ridge to the south outside the summit defences (Fox & Green 1982:69). The shells derive from a period when Pit 10 had been abandoned and was used as a dump. Fox & Green (1982:77) argued that the existence of a large roof covering a 6 m square pit would have blocked the view along the ridge, rendering the defences of phase 2 and 3 ineffectual. This suggested Pit 10 belonged either to the first or last phase. Because Fox and Green had no stratigraphic evidence for its position in their chronology, they opted for a final phase date for it. However, the radiocarbon age of this sample (NZ 6279) of 492±35 B.P. indicates they made the wrong choice, although the reasoning was correct. As comparable dates for phases 2 and 3 described below will show, the deposition of the shells and use of this pit as a trash dump belongs to phases 2 and 3. Big Pit 10 should be assigned instead to phase 1. This makes it contemporary with a similarly large pit, 9, adjacent to it, which stratigraphically did predate the palisading of phases 2 and 3 (Fox & Green 1982:70).

The location of AU 2051 is fairly well recorded in the notes and the drawing for Square F5. It came from a 61 cm^2 patch just inside the phase 3 palisade posthole alignment across the square on the edge of the knoll, and sealed in by the second layer, the deposition of which was associated with the reconstruction of the phase 3 palisade. The sample then is securely associated stratigraphically with the phase 2 palisade postholes on this side (Fox & Green 1982:64), and as the notes say "from the stratigraphic sequence and the amount of wood, much of it partially charred and *totara* from its look, the post butts were burned off at this level to the ground, and then the area renewed by a buildup of clay". The radiocarbon age of the charcoal sample (NZ 6277) of 420±52 B.P. therefore gives a very good estimation for the period when the open settlement was converted into palisaded summit enclosure.

The exact position of AU 2002 is also well recorded. It is also from phase 2, this time from a deep palisade posthole in the baulk F8-9, in the portion of the square assigned to F9 (Fox & Green 1982:62 and Fig. 6, Fig. 8 Y^2-Y^1). The radiocarbon age of this charcoal sample (NZ 6274) of 345±51 gives an age estimate for phase 2 that can be directly compared with the previous sample.

The position of AU 2035 is not quite so precisely fixed as the previous two. It is recorded as coming from the fill of a posthole in the southwest corner of Square F5, and the original feature plan of this square reveals three postholes in that corner region, two of phase 3 and one of phase 2. The posthole nearest the southwest corner belongs to phase 3 and is the most likely candidate (Fox & Green 1982: Fig. 6). While not significantly

different statistically from the previous two dates, it does yield a slightly younger age range as would be expected. The sample (NZ 6276) has a result of 293 ± 56 years B.P.

Calendrical age of occupation

It is now well known that radiocarbon results have to be calibrated for secular effect to obtain accurate calendrical dates. The D.S.I.R. Institute of Nuclear Sciences' Radiocarbon Laboratory has long done this on the basis of a secular correction as distributed in 1972 at the 8th International Conference on Radiocarbon Dating by H.N. Michael and E.K. Ralph (an up-date of that published, Michael & Ralph 1972), and appropriately calibrated ages are routinely supplied for each radiocarbon determination in their summary reports. As a matter of policy the laboratory does not attempt secular corrections for shell or other samples of marine origin, because of the solely terrestrial (tree ring) origin of the present calibration curves. The results supplied by the New Zealand laboratory are given in the first column of Table 1. I have followed McFadgen's (1982) suggested procedure for calculating an uncalibrated but comparable age for the shell sample.

Table 1. Calendrical age corrections for six samples from the Maioro site (N51/5).

Source:		Michael & Ralph (1972)[1]	Stuiver (1982)	Klein et al. (1982)
Confidence Limits:		67%	67%	95%
Laboratory No.	*Phase*	A.D.	A.D.	A.D.
NZ 6276	3	1510-1630	1435-1665	1580-1700
NZ 6274	2	1470-1570	1420-1650	1440-1570
NZ 6277	2	1440-1540	1400-1525	1390-1500
NZ 6279(shell)	2-3	- - - - -[2]	1340-1485	1390-1470
		1400-1600[3]		
NZ 6275	1	1100-1200	1060-1275	1160-1280
NZ 6278	1	1040-1160	1035-1255	1100-2220

[1] This is a secular correction as distributed at the 8th. International Conference on Radiocarbon Dating by H.N. Michael and E.K. Ralph, but is different from and up-dates that published in the volume from that conference. It is the one currently employed by the New Zealand laboratory in supplying corrections for secular effect to samples of terrestrial origin.

[2] The New Zealand laboratory does not correct shell samples for secular effect.

[3] McFadgen (1982) supplies the best approximation that can be used in the last 1000 years in New Zealand to get an equivalent calendrical date to those on charcoal and wood. This represents a 95% confidence limit.

The Michael and Ralph table for secular correction is only one of a great number of calibration curves that have appeared (Klein *et al.* 1982:103-104). These have all been used by archaeologists, with little consensus as to which are the more appropriate. All reflect similar long-term changes in atmospheric radiocarbon concentrations, yet differ significantly in their treatments of shorter period variations (Klein *et al.* 1982:104). Also a much larger number of dendrochronologically dated wood samples have now been analysed by much more precise radiocarbon techniques, and the sources of the wood samples have been extended regionally from chronologies for bristlecone pine to those for giant sequoia, douglas fir, Irish oak, and German oak.

Now two new calibration curves have appeared which overcome some of the problems involved. One is a high-precision calibration curve from the Seattle laboratory (Stuiver 1982) which has been shown to have near universal acceptability in that it exhibits only negligible differences in atmospheric C14 levels with other regions, and minor but calculable differences due to laboratory bias or calibration methods. The possibility of systematic radiocarbon age differences from the northern hemisphere curve for the southern hemispheric samples still has to be tested in more detail, but an upper limit for them appears to be 32 to 40 years (Stuiver 1982:5, Polach 1976:275-76). The other calibration is a consensus data table based on 1154 samples from five laboratories and two species of wood (Klein *et al.* 1982). An advantage of this calibration table is that it provides *date ranges* at the more useful 95% confidence limits, the range being chosen according to the size of original laboratory error. It also provides a means of determining results when more than one date range is possible for a single radiocarbon result.

Calendrical age range for the six Maioro site samples based on these two calibration curves are supplied in the second and third columns of Table 1. The intent is to assess and perhaps improve on the calendrical age ranges supplied by the New Zealand laboratory. I have applied these calibration curves to the shell sample also simply to see if they indicate any difference with results obtained by using the method recommended by McFadgen (1982:384).

From the discussion of context in the previous sections and from Table 1, it is evident that fairly accurate calendrical assessments for phase 1 and for phases 2 and 3 are indicated by the age ranges. Samples NZ 6275 and NZ 6278 have been related above to phase 1 events at a time when the site was an open settlement. The dates are not significantly different from each other statistically, and support the notion that if one sensibly chooses the upper limits of their age range then occupation of the site had begun by the thirteenth century A.D. This is a very interesting outcome in light of the association of phase 1 with the 2B imported argillite adzes. Once again we have evidence of an undefended settlement with large storage pits during what is generally thought to be the archaic period. In this respect it may be compared with the early Skipper's Ridge open settlement (N40/7) (Davidson 1975:75). Our image of what are proper archaic sites is still too dominated by artefact and bird bone rich beach middens, at least in the North Island of New Zealand, to easily pick out other sites as also of possible early age.

Samples NZ 6274 and NZ 6277 provide an excellent means for estimating the calendrical age of phase 2 when the site first functioned as a stockaded *pa* enclosure. A palisade post and charcoal patch, both with nearly identical results, attest to a fifteenth century A.D. occupation.

This is at least a century earlier than was anticipated (Fox & Green 1982:78). A supporting radiocarbon result not statistically significantly different from these two is NZ 6276. It is for a posthole fill, probably of phase 3, although phase 2 is not impossible. On the phase 3 interpretation preferred here, it would support our previous assessment that the phase 2 to 3 interval represents "a relatively short period of occupation, say 100 years or four or five generations of a chiefly family" (Fox & Green 1982:78). On the three calibrations of its age range, and especially the Klein *et al.* it could be argued that a sixteenth century A.D. age for phase 3 is more likely. It was during the phase 2 to 3 occupation, on the evidence of an identical age for NZ 6279, that the use of large Pit 10 as a trash dump also occurred, which places the use of Pit 10 as a storage structure in phase 1.

The implied time interval of no occupation during the fourteenth century A.D. between the phase 1 occupation and that of phases 2 and 3, is indicated in places on the site by a soil horizon as in Fig. 1. Such an interval would be required for a horizon of this type to form. Phase 4 when the site again was used as an open settlement or storage and burial area apparently followed shortly after phase 3. Although undated by radiocarbon samples a sixteenth to seventeenth century A.D. date is most likely. Thereafter the open pits record the last three centuries in the upper layers of their highly stratified fills as in Pits 3, 5 and 8 (Fox & Green 1982:68-69 and Fig. 8).

Conclusion

The Maioro site, when it was excavated, was thought probably to be a late site which would help to resolve the distinction between the then newly defined archaeological category of undefended settlement and that of the defended site or *pa*. The answer to that question has proved to be that at different points in its history it was both. It is also now demonstrated that the original assessment of the chronological age of this site, and even that in 1982, was mistaken. Successive occupations there have proved to be much earlier than expected. The site began as an undefended settlement in the thirteenth century, became a twice palisaded *pa* in the fifteenth and sixteenth century A.D., and open settlement again shortly thereafter. Features associated with the first phase provide more evidence of the existence of large and small store pits from early in New Zealand prehistory and establishes for the first time a respectable antiquity for some form of raised storage platform as predicted by Geelen de Kabath (n.d.:14). Subsequent occupations provide a solid antiquity, 1400-1650 A.D., for the palisade defended *pa* with only minimal terrace scarping, and no major earthworks like ditches or banks. Finally during this period the site displays something of the internal arrangements within a summit enclosure.

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